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leased by Samuel Kœhler about three miles from the village of Kutztown, who intends to have ready accommodations for visitors and explorers during this April.—H. W. HOLLENBUSH. *Reading, Pennsylvania.*

MICROSCOPY.

AN IMPROVED MODE OF OBSERVING CAPILLARY CIRCULATION. As I have never seen in print the following method of exhibiting the circulation of the blood in the frog, I send it hoping that it may enable some one interested in such studies to demonstrate the distribution and influence of the nerves upon the capillary vessels and circulation. I have, for over twenty years, been aware of the peculiar manipulation presently to be described; where I first obtained the knowledge, or how, I cannot state. I have made the facts known to a great many microscopists, and have not, as yet, met any one who previously knew it. If we grasp a frog in the hand and plunge it in water about as warm as can be conveniently borne, say about 120°, though I have never measured this, judging simply from the apparent warmth to the hand, we shall find that, in a few moments, the frog will become perfectly rigid; it may now be removed and laid upon a plate for dissection. Carefully opening and stretching the parts by pulling upon the fore limbs gently, or even cutting the bones if necessary, the heart may be displayed, showing the contraction and expansion beautifully; and if now the animal is placed in warm water, the lungs will immediately float out, and by a suitably contrived stage, the circulation may be examined. It is better, however, not to do this but to draw out gently the large intestine by means of blunt forceps, and then spreading the mesentery on the glass of the frog plate (I find it convenient to use a large one with an elevated glass, instead of one in the same plane, on which to spread the mesentery) we can observe the capillary circulation very nicely with a $\frac{1}{4}$ or $\frac{1}{5}$ inch objective, by dropping a bit of thin glass over the place or with a higher power "immersion." Of course the parts opened must be kept moist and covered with a cloth, and a few drops of tepid water added from time to time. If the experiment has been properly conducted, the animal will remain perfectly quiet and the circulation will continue for hours; I cannot say how long, for I have never known it to cease until long after I had finished all the exhibition I have ever had occasion to make.

If the frog is a large one, the mesentery can be spread out so as to afford the most magnificent exhibition of capillary circulation, with a distinctness, and under an amplification which will excite the greatest admiration and astonishment in any one who has only seen it hitherto in the web, or the tongue.

The objectives of a high power ought to be more tapering at the end than our American makers usually furnish them. In this respect, some of the foreign objectives are superior. It would be very little more trouble to make the higher powers at the object end but little larger than the front lens, and thus infinitely more convenient for work than with the large flat surface which most of them now present. In fact, with a $\frac{1}{8}$ or $\frac{1}{12}$ American objective, as ordinarily made, it would be impossible to approach sufficiently near to the mesentery to focus on the smaller capillaries without striking some of the larger bloodvessels. If nothing more could be done, the front set at least might be mounted in a little projecting tip or nose, and if those who are ordering objectives will insist upon this, I doubt not the opticians will do their part.—H. L. Smith.

The New Erecting Arrangement.—In the January number of this Journal, and also in the Monthly Microscopical Journal of the same date, Dr. Ward describes "A new erecting arrangement especially designed for use with Binocular Microscopes." The arrangement proposed by Dr. Ward will undoubtedly work as he proposes, but *cui bono?* It is an axiom in microscopy, as well as in other pursuits, that the simplest means of accomplishing an end is the best. Dr. Ward's arrangement is complicated and troublesome, and unless all the lenses are well made and carefully centred, definition will be injured. Dr. Ward is correct in his observation that the "*erectors usually furnished* [italics are mine] are not good and the use, otherwise satisfactory, of a good objective as an erector has not yet afforded the advantage of binocular vision." The first clause is correct because "the erectors usually furnished" reverse, counteract or destroy all the corrections which the opticians have taken so much pains to introduce into the objectives. The second clause refers to binocular vision. This has been completely accomplished by Tolles' binocular eyepiece which has been in use and before the public more than six years. Without any change from, or addition to, its regular construction or use, it gives an image *erect*, *binocular* and *stereo-*

scopic with any objective, from a four-inch to a $\frac{1}{15}$ inch; and of course it may be used for dissecting by transmitted or reflected light with any objective having "working distance" enough for manipulation — certainly with a half-inch. The only objection, if it is one, against the instrument for this use, is that the "power," the amplification, is necessarily higher than with other binoculars. But where a *very low* power is wanted I believe a pair of spectacles set with magnifying periscopic lenses will prove to be better than any binocular dissecting microscope yet devised. But the objection to the "usual erector" for monocular instruments remains. This was remedied by Tolles years ago; so long ago that he has forgotten when. He made erectors that did not disturb any of the corrections of the objective, but preserved them and gave as good effects as were obtained without an erector.

When will American microscopists learn what has been done in instruments made in their own country, by their own artists? C. S.

Note on the Above Remarks. — It can hardly be necessary to state that Tolles' binocular eye-piece, with which the writer has sometimes worked, was ignored in the paper referred to, simply because there was no occasion to mention it,— it being no novelty but an article whose properties, have been perfectly familiar to American (and foreign) microscopists for years. It is only fair to add that the new arrangement, which can be added to any microscope at a cost of two or three dollars, has been used for months by several microscopists who consider it extremely simple and convenient.

That an erector (or anything else) however perfect, can be added to the objective and ocular and give "as good" optical effects as would be obtained without the additional refracting and dispersing surfaces, is much disputed and surely cannot be considered a conceded point at the present time.

If Mr. Tolles is prepared to supply the market with erectors radically superior to those generally used, microscopists will doubtless learn the fact when it is announced, as I do not find it now, in the catalogue of the Boston Optical Works or in their advertisements in the Naturalist and other journals.— R. H. W.

Oblique Illumination.— A new contrivance, for obtaining oblique transparent illumination with high powers and black ground illumination with medium powers, was introduced by Col. Horsley of the East Kent Natural History Society. He uses light reflected from the inside of a broad, short, silver-plated tube beneath the object. The tube may be silvered, not very permanently, by rubbing it with a solution of nitrate of silver and hyposulphite of soda. Such a tube, placed in the stage opening, would give a more oblique illumination than could easily be obtained otherwise in instruments having a thick stage.

GLYCERINE IN MICROSCOPY.— Dr. W. M. Ord, of St. Thomas Hospital, London, questions the safety of glycerine as a medium for studying and mounting microscopic objects. Its solvent power over carbonate of lime is well known, and he had found it ruinous to crystals of murexide, oxalate of lime, and triple phosphate. Might it not produce unsuspected molecular changes in other objects? Portions of tissue preserved unaltered in it for years, might have been affected in molecular constitution by it at the first penetration and before the first observation. More light is wanted on this subject.

PRACTICAL HISTOLOGY.— Dr. Wm. Rutherford gives, in the Quarterly Journal of Microscopical Science for January 1872, a synopsis of his course of instruction in Histology. The paper is too long to reprint and too dense for abstract, but it is full of suggestions that will be useful to many others besides medical students. The author has a dashing and not unattractive manner of expressing his dissent from the opinions of most microscopists in England and this country in regard to apparatus, etc.

VARIATIONS IN SIZE OF RED BLOOD-CORPUSCLES.— Manassein ("Centralblatt" No. 44, October 28th, 1871) gives the result of more than forty thousand measurements on one hundred and seventy-four different animals, intended to show the effect of various physiological and morbid influences on the size of the red corpuscles. In general, influences which raise the temperature of the body were found to diminish the size of the corpuscles, such as very high temperature of the external medium, or septic poisoning. Excess of carbonic acid in the air also acts in the same way. Oxygen, on the other hand, increases the dimensions of the corpuscles, and so do, in general, all substances which depress the animal temperature, as external cold, quinine, hydrocyanic acid, and intoxicating doses of alcohol. Morphia is an exception, since, though it generally reduces animal temperature, the corpuscles become larger under its influence. Finally, acute anæmia (produced by arterial hemorrhage) increases the dimensions of the corpuscles.— *Quarterly Journal of Microscopical Science.*

COMPARATIVE SIZE OF RED BLOOD-CORPUSCLES.— Mr. George Gulliver states in the same Journal, that recent measurements confirm his conviction that the size of these corpuscles, in families of fishes and reptiles, bears little relation to the size of the species; while in many families of birds and mammals, there is such relation, the largest corpuscles occurring in the largest species and the smallest corpuscles in the smallest species.

VITALITY OF ORGANIC GERMS AT HIGH TEMPERATURE.— This standard question of the experimenters in spontaneous generation, is attracting increased attention from its relation to the more fashionable question of disinfection. It is discussed in several numbers of the "Chemical News." Mr. G. E. Davis calls attention to the fact that the ovens, in which fabrics are baked for purposes of disinfection, are often irregularly heated and may vary fifty degrees from the thermometer's indication. Hence, making allowance for this uncertainty, the highest temperature desired cannot be safely attempted, and the temperature attempted may not be gained. He believes that the heat employed has little action upon the disease germs, and rather tends to encourage their growth. He advises that a vessel of carbolic acid diluted with an equal volume of water be placed near the clothing, in order to gain the combined effect of the heat and the phenol vapor.

Mr. Richard Weaver states that 350° Fahr. is the highest temperature available for disinfecting clothing: and Mr. H. B. Yardley queries whether germs might not be destroyed at intermediate temperatures although they would live at certain lower and higher degrees; thus, might not life be destroyed at 330°, which would continue to exist at 200°, 300° and 400°?

"OBJECT TEACHING" IN MICROSCOPY.— It is customary at the regular fortnightly meetings of the East Kent Natural History Society at Canterbury, England, to make dissections of plants and animals, and microscopical demonstrations of the same. The three following items are derived from the Proceedings of this society.

SIZE OF BLOOD-DISCS.— Mr. George Gulliver predicted that these corpuscles would soon be recognized as of importance in systematic zoology, and demonstrated the relation of their size to the respiratory function. The blood-discs of Amphiuma are the largest now known, supplanting, in this respect, those of the familiar Proteus.

RAPHIDES AND PLANT-CRYSTALS.— Mr. Fullager gave demonstrations of the crystal-prisms of Quillaia bark, and noticed their size, prismatic and angular outline and polarizing properties, as points of distinction from true raphides which are acicular and occur in bundles. The order Iridaceæ abounds in crystal-prisms. Mr. Gulliver showed the great importance of plant-crystals, especially raphides, in systematic botany; the raphidian character being so eminently natural, and so much more fundamental and general than other single diagnostics. "The shortest and sharpest diagnosis of the Onagraceæ would be Calycifloral Exogens abounding in raphides; of Galiaceæ, Corollifloral Exogens abounding in raphides; of Orchidaceæ, Gynandrous Endogens abounding in raphides; of Hydrocharidaceæ, Hydral Endogens destitute of raphides." Similar examples occur extensively in Mr. Gulliver's Memoirs in the Pop. Sci. Rev., Oct. 1865; Ann. Nat. Hist., 1861–1865; Quart. Jour. Mic. Sci., 1864, 1865, 1866, 1869; Seeman's Jour. Bot., 1864, 1866, 1867 and 1869. The crystal-prisms of Quillaia bark, shown by Mr. Fullager, and of Guaiacum, demonstrated by Col. Horsley, test the genuineness of the officinal barks; for though crystal-prisms abound in many British Endogens and in exotic Exogens they have not yet been observed in native Dicotyledons: and while true raphides are not uncommon in foreign shrubs and trees, they have not yet been demonstrated in any British trees. Sphæraphides were shown by Col. Horsley in the prickly pear (Opuntia) and by Mr. Gulliver in the Carophyllaceæ. The raphidian character of the British species of Lemna was constrasted with the exraphidian Wolffia. Of the British Euphorbiaceæ, Mercurialis alone abounds in sphæraphides; and the curious starch-sticks are equally characteristic of Euphorbia. By the raphidian diagnosis, the minutest portion of a plant may often be located in its own order as distinguished from all other orders of the same alliance.

RESPIRATION IN ABRANCHIATE WORMS.— Mr. Gulliver exhibited and described a worm, about a quarter of an inch long, of the

Naid family which abounds in pools near Canterbury. The vivid action of the vibratile cilia within the intestines, causing a rapid current of water, was seen in the pellucid segments of the thin, flat body, and was regarded as a true respiration. The same may be seen in *Sanuris variegata.*

DEVELOPMENT OF HYDRODICTYON.—Mr. Keit, of the Dublin Microscopical Club, obtained, by cultivation, two forms of this plant, an irregular network of large cells, and the ordinary nets which "appeared" to be produced from the irregular form. Further study is promised.

THE MALTWOOD FINDER.—This little accessory, used by almost every microscopist, is used under two disadvantages, the want of exact correspondence in position of the scales on different plates, and the size of the squares, in one of which, under a high power, an object may still be lost. Mr. W. K. Bridgman offers, in the "Monthly Microscopical Journal," a means of correcting these difficulties.

Each person using the finder in exchanges, is advised to prepare a common slide with a label in the centre and a dot on this, indicating the position of the centre of the central square of his own Finder. This "test slide," properly named, may be sent to any correspondent as a key to the correction if any, to be made in using *his* Finder.

The position of an object in a square must be recorded, or much of the usefulness of the Finder is lost. Mr. Bridgman indicates this position by a dot having the same relation to the figures. Thus $\genfrac{}{}{0pt}{}{2\,5}{2\cdot5}$ would indicate that the object was situated in the centre of the square $\genfrac{}{}{0pt}{}{2\,5}{2\,5}$, or $\genfrac{}{}{0pt}{}{2\,^{\cdot}5}{2\,5}$. that it was far to the right of the centre. The writer (R. H. W.) has always been accustomed to record the position in the square by decimals; as, in the cases above, $\genfrac{}{}{0pt}{}{25\cdot5}{25\cdot5}$ and $\genfrac{}{}{0pt}{}{25\cdot9}{25\cdot5}$. This plan, which is convenient, and not liable to mistakes, has been mentioned to many persons, and doubtless used independently by many more, but is not recollected to have been published before. It is accurate to within one-tenth of the diameter of a square, which is quite sufficient in practice; but two places of decimals may be used, if deemed necessary, to indicate positions very near a line, as $\genfrac{}{}{0pt}{}{25\cdot01}{25\cdot5}$ or $\genfrac{}{}{0pt}{}{25\cdot99}{25\cdot5}$.